OUTCOMES BASED LEARNING MATRIX

Course Description: The course will introduce students to the principles and techniques in the field of forensic chemistry. Topics will include organic analysis, inorganic analysis, DNA, glass and soil samples, drugs, fire, and blood. Students will learn the techniques for the analysis of compounds, including microscopy, electrophoresis, chromatography, and spectroscopy. Students should gain a basic understanding of the capabilities and limitations of the forensic sciences as they are presently practiced. Lecture: 3 hours. Labratory: 2 hours.
Prerequisite: Intro to Algebra (MATH 101) and Investigative and Forensic Services (CJUS 223)

Course: Criminal Justice Forensic Chemistry CHEM 153

Department: Physical Science

At the end of the course, students will be able to:	**Students will participate in:**	**Faculty will evaluate:**
COURSE OUTCOMES	**OUTCOME ACTIVITIES**	**Assessment Tools**
Introduction: -define and describe how matter is classified. -differentiate between physical and chemical properties/changes -use prefixes to convert between units -describe types of forensic services and their roles -identify key scientists in the forensics -describe methods of examining physical evidence	- lectures, discussions, and demonstrations. (CT, QS, OC) -reading the text, including sample problems. (CT, R, QS) -solving assigned problems. (CT, R, QS) -experiments during laboratory sessions. -organizing and documenting information in lab reports. (CT, W, QS)	-Tests with emphasis on solving problems (CT, W, R, QS) -Lab performance (CT, QS, TS, R, OC) -Lab reports (W, QS, CT)

Glass and soil analysis: -describe refraction and the refractive index -compare different types of glass -know methods of glass analysis -describe type of fractures and identify photos -identify soil types -describe soil analysis techniques	- lectures, discussions, and demonstrations. (CT, QS, OC) -reading the text, including sample problems. (CT, R, QS) -solving assigned problems. (CT, R, QS) -experiments during laboratory sessions. -organizing and documenting information in lab reports. (CT, W, QS)	-Tests with emphasis on solving problems (CT, W, R, QS) -Lab performance (CT, QS, TS, R, OC) -Lab reports (W, QS, CT)
Microscopy: -identify the parts of the microscope -trace the history of the microscope -be able to identify and explain the different types of microscopes	- lectures, discussions, and demonstrations. (CT, QS, OC) -reading the text, including sample problems. (CT, R, QS) -solving assigned problems. (CT, R, QS) -experiments during laboratory sessions. -organizing and documenting information in lab reports. (CT, W, QS)	-Tests with emphasis on solving problems (CT, W, R, QS) -Lab performance (CT, QS, TS, R, OC) -Lab reports (W, QS, CT)
Hair, fiber, and paint: -describe the 3 layers of the shaft -identify different types of scales -discuss the 3 phases of hair growth -techniques used for hair identification -types of fibers and how they are analyzed -describe characteristics of paint -identify the layers of paint and techniques of analysis	- lectures, discussions, and demonstrations. (CT, QS, OC) -reading the text, including sample problems. (CT, R, QS) -solving assigned problems. (CT, R, QS) -experiments during laboratory sessions. -organizing and documenting information in lab reports. (CT, W, QS)	-Tests with emphasis on solving problems (CT, W, R, QS) -Lab performance (CT, QS, TS, R, OC) -Lab reports (W, QS, CT)

Organic analysis: -know the groups of the periodic table -classify elements as metal, nonmetal, or metalloid -describe the different types of chromatography: paper, liquid, and gas -describe electrophoresis -explain the use of spectroscopy and light absorption -identify parts of a spectrophotometer -explain how UV-Vis and IR spectrophotometry and mass spectroscopy are used to analyze samples -identify spectra	- lectures, discussions, and demonstrations. (CT, QS, OC) -reading the text, including sample problems. (CT, R, QS) -solving assigned problems. (CT, R, QS) -experiments during laboratory sessions. -organizing and documenting information in lab reports. (CT, W, QS)	-Tests with emphasis on solving problems (CT, W, R, QS) -Lab performance (CT, QS, TS, R, OC) -Lab reports (W, QS, CT)
Inorganic analysis: -describe emission spectroscopy -explain difference between continuous and line spectrum -determine number of electrons, protons, and neutrons -write isotopes using 2 methods -describe atomic absorption spectroscopy -describe neutron activation analysis and X-ray diffraction techniques	- lectures, discussions, and demonstrations. (CT, QS, OC) -reading the text, including sample problems. (CT, R, QS) -solving assigned problems. (CT, R, QS) -experiments during laboratory sessions. -organizing and documenting information in lab reports. (CT, W, QS)	-Tests with emphasis on solving problems (CT, W, R, QS) -Lab performance (CT, QS, TS, R, OC) -Lab reports (W, QS, CT)
Drugs: -explain difference between physical and psychological dependence -identify 3 ways the DEA classifies drugs -identify and describe effects of narcotics,	- lectures, discussions, and demonstrations. (CT, QS, OC) -reading the text, including sample problems. (CT, R, QS) -solving assigned problems. (CT, R, QS) -experiments during laboratory sessions.	-Tests with emphasis on solving problems (CT, W, R, QS) -Lab performance (CT, QS, TS, R, OC) -Lab reports (W, QS, CT)

hallucinogens, depressants, stimulants, and club drugs -describe the schedules of Controlled Substance Act -know techniques of drug analysis	-organizing and documenting information in lab reports. (CT, W, QS)	
DNA: -describe the parts of a nucleotide -differences between RNA and DNA -describe transcription, translation, replication, PCR, and STRs -explain the importance of mitochondrial DNA -techniques of collection and preservation of samples	- lectures, discussions, and demonstrations. (CT, QS, OC) -reading the text, including sample problems. (CT, R, QS) -solving assigned problems. (CT, R, QS) -experiments during laboratory sessions. -organizing and documenting information in lab reports. (CT, W, QS)	-Tests with emphasis on solving problems (CT, W, R, QS) -Lab performance (CT, QS, TS, R, OC) -Lab reports (W, QS, CT)
Toxicology: -explain effects of alcohol and absorption factors -describe circulatory system briefly -explain breath tests -technique for analysis of blood and drugs -techniques of collection and preservation of samples	- lectures, discussions, and demonstrations. (CT, QS, OC) -reading the text, including sample problems. (CT, R, QS) -solving assigned problems. (CT, R, QS) -experiments during laboratory sessions. -organizing and documenting information in lab reports. (CT, W, QS)	-Tests with emphasis on solving problems (CT, W, R, QS) -Lab performance (CT, QS, TS, R, OC) -Lab reports (W, QS, CT)
Serology: -list blood types and what makes them different -identify components of blood -discuss immunoassay techniques -types of antibodies	- lectures, discussions, and demonstrations. (CT, QS, OC) -reading the text, including sample problems. (CT, R, QS) -solving assigned problems. (CT, R, QS) -experiments during laboratory sessions. -organizing and documenting information in lab reports. (CT, W, QS)	-Tests with emphasis on solving problems (CT, W, R, QS) -Lab performance (CT, QS, TS, R, OC) -Lab reports (W, QS, CT)

-techniques for characterizing blood stains, human or animal, which human -explain heredity and chromosomes		
Arson: -describe types of energy -understand oxidation reactions -techniques of collection and preservation of samples	- lectures, discussions, and demonstrations. (CT, QS, OC) -reading the text, including sample problems. (CT, R, QS) -solving assigned problems. (CT, R, QS) -experiments during laboratory sessions. -organizing and documenting information in lab reports. (CT, W, QS)	-Tests with emphasis on solving problems (CT, W, R, QS) -Lab performance (CT, QS, TS, R, OC) -Lab reports (W, QS, CT)